Public Utilities

The Public Utilities Element addresses the City's four publicly-provided utility systems:

The water system that provides potable water to City residents, businesses, and institutions;

The wastewater system that collects, conveys, and treats wastewater;

The stormwater system that collects, manages, conveys, and treats stormwater runoff from buildings and impervious areas; and

The reuse water system, a relatively new utility system for the City, that provides treated water for certain uses such as irrigation.

In addition to the above City systems, this Element also addresses private utility systems such as electric and gas utilities.

The City's water and wastewater utilities are regional in nature, and include the nearby communities of Garner, Rolesville, Wake Forest, Knightdale, Wendell, and Zebulon in addition to Raleigh (see Map PU-1, which shows the utility service area). Serving these communities has required new utility infrastructure to be extended into eastern Wake County, including sewer trunk lines ~~and~~, a new pump station and an extension of a sewer line. While intended to serve customers in eastern Wake municipalities, these improvements also potentially open intervening lands for development on public water and sewer.

Driven by population growth, demand for water and sewer ~~has been growing.~~services grew during much of the previous decade. Between 2000 and 2007, average daily demand at the E.M. Johnson Water Treatment Plant at Falls Lake rose from 44.4 to 50.7 millions of gallons per day (MGD). However, this ~~rise was~~trend not ~~linear – in 2003, a drought year, demand actually dropped to 43.4 MGD, down~~continued since 2010, as drinking water demands have remained relatively static (ranging from ~~47.4 MGD in 2001.~~48.6 to 51.99 MGD), despite adding an estimated 55,000 new customers to the service area. It is believed the adoption of tiered water rates, a long term conservation response from the 2007/2008 drought, and normal to higher than average annual rainfall totals have all contributed to offsetting additional water demand. To accommodate anticipated future growth throughout the service area, a 20 MGD water treatment facility was constructed in 2010 at Lake Benson, which is used to augment the existing Falls Lake drinking water resource. The ~~vast~~ majority of wastewater flow is delivered for treatment to the Neuse River ~~Wastewater Treatment Plant~~Resource Recovery Facility, where volumes have grown from ~~36.2~~43.8 to ~~42.0~~46.4 MGD between ~~2000~~2010 and ~~2007~~2015. The peak volume during this period occurred in ~~2005~~2015 with an average daily throughput of 46.~~2 MGD~~4 MGD, although this was likely influenced by wet ground conditions and subsequent infiltration and inflow into the collection system.

Significant growth ~~is~~continues to be anticipated in the future. Water treatment plants must be sized for peak daily demand, which is expected to grow from ~~80~~77 MGD in ~~2006~~2007 to 130 MGD in 2030. Current plans to meet this demand include ~~the new Dempsey Benton plant on Lake Benson, rated at 20 MGD~~; an expansion at E.M. Johnson to add 34 MGD of capacity; and the ~~Little River Plant,~~option to ~~be built on a future reservoir, and rated at 20~~expand the Dempsey E. Benton plant at

40 MGD. Expansions at existing wastewater treatment plants will increase total treatment capacity to a little over 84 MGD, mostly coming from a 15 MGD expansion at the Neuse River plant~~.~~, which is currently underway. At this time, potential future water sources include the reallocation of the conservation pool at Falls Lake (to provide additional drinking water volume) and the construction of the Little River Reservoir in eastern Wake County

Collectively, these proposed investments in utility infrastructure, including the extensions serving the nearby towns where Raleigh has formal utility merger agreements~~, comprise~~. It will be the largest single share of the City's ~~next five years of~~ capital spending~~.~~ from 2018 to 2023. Water and wastewater projects total $~~545~~688 million in the latest Capital Improvement Program (CIP). This is 37 percent of the City's CIP total, compared with 15 percent for transportation projects. As an enterprise within the City, the bulk of this spending is funded with Revenue Bonds backed by future utility billing receipts.

Beyond these major fixed investments, the City's utility systems require continual investment to keep pace with demand, replace aging facilities, and keep systems in a state of good repair. Financing of these systems depends upon future revenue streams. The water and sewer utilities are funded through ~~water~~utility bills as well as one-time connection fees. Utility acreage fees, one-time fees assessed on new development, help fund the cost of constructing major water and sewer lines serving an area.

Stormwater is funded through a monthly fee on all development with impervious surfaces in excess of 400 square feet~~.~~, and this fee was recently increased by 24 percent. Debt service on major new stormwater investments is supported by recurring fees levied across all development, existing and new.

These vital infrastructure systems are critical to the City's continued growth and development, and their proper functioning has major environmental implications. Water, wastewater, and stormwater systems are embedded in the region's hydrology, and the quality of our lakes, rivers, and other surface waters is heavily influenced by the operation of these systems.

This element addresses the following major issues:

Making more efficient use of available water, matching source characteristics with intended uses, and ~~*establishing conservation as an ongoing process rather than a tool reserved only for crises.*~~pricing water to reflect the true cost of service. Not all uses of water, including irrigation, require pristine, potable water sources. Irrigation uses may also rely on reclaimed water or cistern-stored rainwater;

Planning for water resources in the face of a changing and uncertain climate that may result in greater extremes of rainfall and drought. ~~*While Falls Lake has an estimated safe yield of 86 MGD, emergency conservation measures had to be implemented in both 2003 and 2007/2008 even though average withdrawals were under 50 MGD. This issue may become more prominent in*~~While the addition of Lake Benson as a drinking water source has significantly increased overall system resiliency and capacity, additional sources will need to be identified and acquired. This planning process may be impacted by the effects of a changing climate;

~~*Providing utility services in the face of rising fossil fuel costs. The secular upwards trend in the oil markets between 2002 and 2008 reflected the new fundamentals of growing world demand*~~

~~*colliding with stagnant global production, as new sources of supply become more expensive and difficult to produce.*~~ As major users of energy, all utility systems will need to respond by looking for efficiencies and alternative energy sources throughout their operations;

Planning for the future in an ever-evolving regulatory environment at the state and federal level;

Planning for future water demands in a competitive resource allocation environment— significant competition for water is to be expected among utility systems, regions, and classes of users (residential versus commercial versus agricultural);

Providing the utility capacity necessary to accommodate the City's future growth, including the expansion of systems as well as the rebuilding and enhancement of systems in older parts of the City;

Better matching the expansion of utility infrastructure with the City's preferred growth patterns and strategies, to minimize costs and maintain each system's financial health; and

Fully educating and involving the public as informed customers and responsible users of vital natural resources.

~~More information on these issues can be found in the Public Utilities Chapter of the 2008 Community Inventory Report.~~

As described in the Framework chapter, Raleigh's Vision for 2030 is structured to address these public utility issues through six vision themes or citywide goals. The Public Utilities Element will allow the City to meet these goals in numerous ways.

Relative to *Economic Prosperity and Equity*, the City's economy depends on the availability of water and sewer infrastructure to support development. Efficient utility planning serves to sustain system adequacy, manage costs, and keep the City's utility rates competitive. The proper management of stormwater serves the goal of equity by protecting downstream properties from the impacts of upstream development.

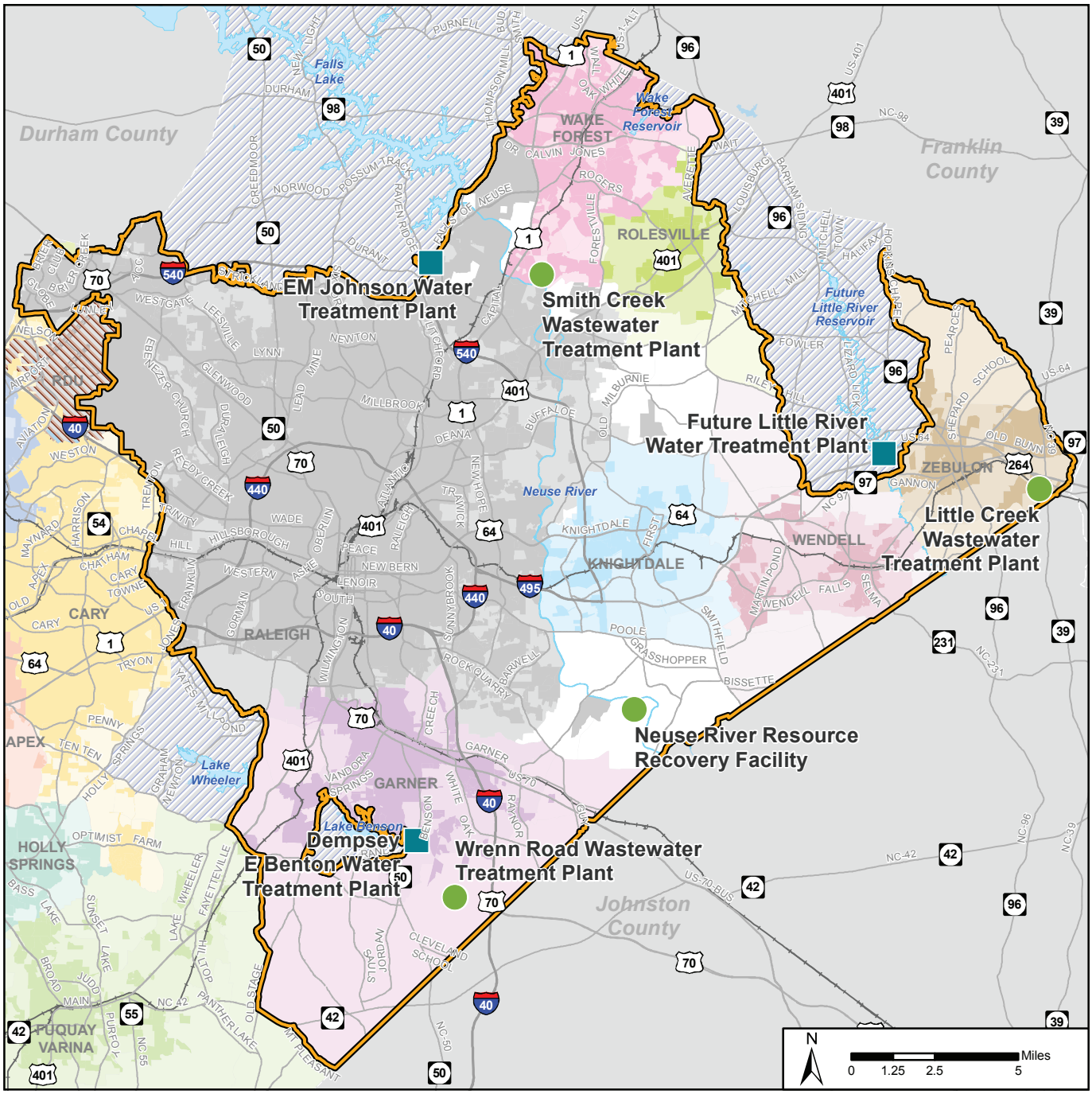
For *Expanding Housing Choice*, the wide availability of water and sewer throughout the City's jurisdiction permits a variety of housing types at different densities to be developed at appropriate locations.

For *Managing our Growth*, decisions regarding when and where to extend utility service significantly impact growth patterns by enabling higher intensity development than could be achieved using well and septic systems. Utility infrastructure must also be adequately sized to meet both present and future needs, requiring coordination with future growth planning.

For *Coordinating Land Use and Transportation*, buildings, roads, and parking lots are significant sources of stormwater runoff; therefore, land use and transportation policies that result in low impact development will also serve to reduce the stormwater impacts of development. Utilities, along with roads, are the major shapers of development patterns.

For *Greenprint Raleigh*, stormwater policies have a significant impact on water quality, as urban runoff is the primary pollutant in the region's surface waters. Ensuring infiltration and recharge of stormwater can help maintain the region's sub- surface aquifers and feed streams during times of low

PU-1: **Water and Wastewater Systems**



Facility Type

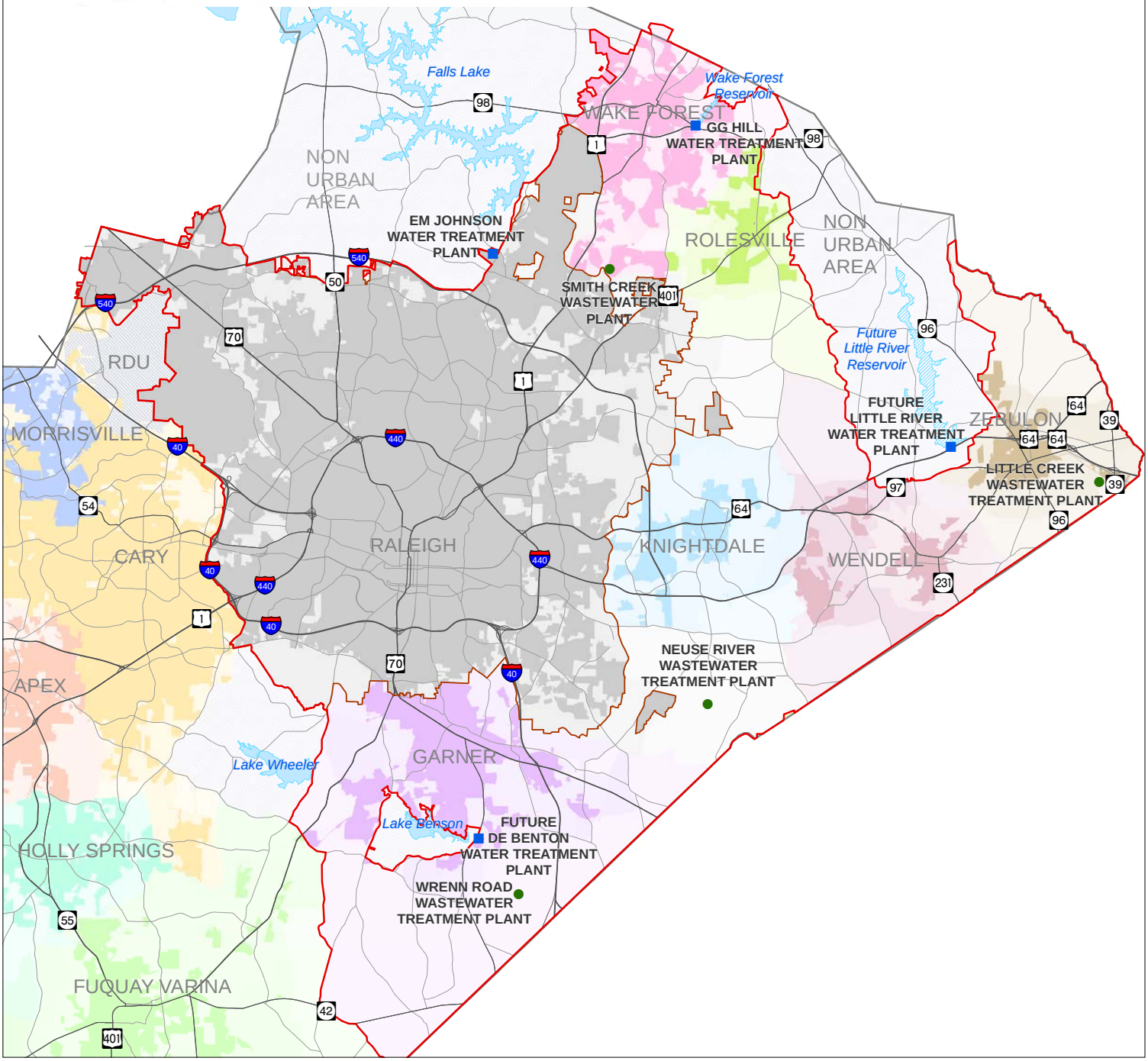
- Water Treatment
- Wastewater Treatment
- Long Range Utility Service Area
- Non-Urban Area

Map created 3/17/2017 by the
City of Raleigh Department of City Planning

Previous Version

CITY OF RALEIGH COMPREHENSIVE PLAN

Water and Wastewater Systems



MAP PU-1

Facility Type

- Wastewater Treatment
- Water Treatment
- Long Range Service Area

- ETJ
- Highway
- Major Streets

N

0 1 2 4 Miles

Map created 10/7/2009 by the City of Raleigh Department of City Planning & GIS Division

rainfall. The City's water and wastewater treatment facilities are now a significant part of the upper Neuse River's hydrology, at times accounting for up to 40 percent of the river's flow downstream of the wastewater treatment plant. The City's re- use water system is a key piece of infrastructure intended to make more efficient use of water resources.

For *Growing Successful Neighborhoods and Communities*, the extension of utilities to formerly undeveloped areas and sites and the growing prominence of infill development and downtown redevelopment may require that additional infrastructure be provided in already built-up parts of the City.

Policies and actions of the Public Utilities Element appear in the next section. To track the efficiency of the City's policies, numbers that relate to the City's six vision themes are used throughout the policy section as follows:

Economic Prosperity and Equity

Expanding Housing Choices

Managing Our Growth

Coordinating Land Use and Transportation

Greenprint Raleigh

Growing Successful Neighborhoods and Communities

Systems and Adequacy

While Raleigh's continued growth necessarily focuses attention on new infrastructure, it is the primary job of any utility system to keep the existing infrastructure in good repair, and to maximize the utilization of those infrastructure investments already made. Portions of the City's water and sewer infrastructure, especially inside the Beltline, are aging and will need reconstruction, replacement, and/or augmentation. A proposed force main paralleling the two existing interceptors along Crabtree Creek is an example, as this project will both address limited capacity as well as provide the redundancy necessary to carry out repairs on the ~~the~~ existing interceptors.

Adequate funding is essential to maintaining utility systems. For publicly-owned utilities, political imperatives push for the lowest possible rates even as maintenance and investment backlogs accrue.

Raleigh's utility rate structure should include all costs to fully operate, maintain, rehabilitate, replace, and expand its utility infrastructure in order to build in incentives to make wise use of resources while fully funding all utility system needs.

The following policies address maintaining the adequacy of the systems serving already developed areas, as well as addressing the capacity needs of the future.

Policy PU 1.1

Linking Growth and Infrastructure

Focus growth in areas adequately served by existing or planned utility infrastructure. (1, 3, 5, 6)

Policy PU 1.2

Infrastructure Maintenance

Rehabilitate and maintain in good condition existing public utility facilities to accommodate infill and to allow for the most efficient use of existing infrastructure. (1, 3, 5, 6)

Policy PU 1.3

Infrastructure Standards for Development

Provide standards and programs that relate development to the adequate provision of infrastructure and public services. (3)

Policy PU 1.4

Addressing Insufficient Utilities

Address insufficiencies in water and sewer lines that threaten health, safety, and overall quality of life. (1, 3, 5, 6)

Policy PU 1.5

Sizing of Water and Sewer Lines

Size water and sewer lines with capacity adequate to serve projected future growth. (1, 3)

Policy PU 1.6

Full Cost Pricing

Encourage full-cost pricing to recognize the real long-term cost of service, which includes maintaining infrastructure in a state of good repair, and to promote environmentally sound decisions by customers. (1, 3)

Action PU 1.1

Reserved

Action PU 1.2

Reserved

Utility Extensions

As Raleigh continues to develop, the City's growth must proceed hand-in-hand with the expansion of the City's utility systems. Leapfrog development patterns and unplanned extensions undermine the goal of system efficiency by increasing the quantity of piping and pumping necessary to serve a given amount of development. Under current pricing schemes, higher costs are borne equally by all customers regardless of location, resulting in inefficient cross-subsidies.

The City's ~~current~~2016-2020 Capital Improvement Program includes new utility extensions to other towns including Wendell and Zebulon where Raleigh has formal utility merger agreements. These new water and sewer mains will cut across eastern Wake County, including through Raleigh's short- and long-range Urban Service Areas. No physical barrier will exist to prevent connections to these mains from adjoining properties~~—~~-only strongly-written and ~~-~~enforced policies can forestall the premature spread of urban growth into these urban reserves.

The policies below address these issues through the coordination of system expansion and new development, and ensuring that developers benefiting from public infrastructure participate in the financing of that infrastructure. Another key objective is that land use planning, through the orderly extension of the City's Extraterritorial Jurisdiction, should precede rather than follow annexation and the extension of utility infrastructure.

Policy PU 2.1

Utility Service Extension Outside the City

Ensure that proposals to extend utility service outside the City are:

• Consistent with service expansion plans;
• Not into current or future water supply watersheds except in accordance with Falls Lake and Swift Creek small area plan policies;
• Sufficient in capacity to accommodate the extension;
• Meet City standards; and
• Enhance the contiguous development of the City (1, 3, 5)

See also Area Plan 7: 'Falls Lake' and Area Plan 19: 'Swift Creek' for City of Raleigh policies on annexations and utility extensions in specific areas of these water supply watersheds.

Policy PU 2.2

Utility Extension Beyond Raleigh's Jurisdiction

Limit the extension of public utilities outside of Raleigh's jurisdiction to cases in which:

• There is a threat to public health, safety and welfare and to Raleigh's drinking water supply,
• Such extensions are necessary to serve merger communities, or
• Such extensions provide the ability to provide interconnects with other utility systems for use in times of drought or extreme weather. (3)

See also A.3 'Annexation, ETJ and USA' for additional City of Raleigh policies on annexations outside the existing Raleigh Extraterritorial Jurisdiction (ETJ).

Policy PU 2.3

Emergency Utility Extension

Allow only existing development posing a specific threat to public health, safety, and welfare and to Raleigh's drinking water supply to connect to emergency utility extensions. (3)

Policy PU 2.4

Water and Sanitary Sewer Installation

Require that water and sanitary sewer lines installed by property owners are constructed along the entire adjacent right-of-way or through the entire property as appropriate to permit further extension to adjacent properties. (1, 3, 6)

Policy PU 2.5

Water and Sanitary Sewer Access

Require that developers provide water and sanitary sewer service to all lots within a subdivision. (3, 5, 6)

Policy PU 2.6

Re-use Water Infrastructure

Consider requiring that residential developers provide “purple pipe” re-use water infrastructure to all lots in a subdivision, as the availability of re-use water expands. Consider restricting the use of potable water for irrigation when re-use water is available. (3, 5)

Action PU 2.1

Reserved

Action PU 2.2

Utility Plan Updates

Routinely update utility plans based on the latest data and population projections to keep plans for capital projects up-to-date.

Action PU 2.3

Reserved

Action PU 2.4

Dual Plumbing Incentives

Study the option of encouraging dual plumbing in houses by offsetting the cost through reduced fees.

Action PU 2.5

Merger Town Development Policies Regarding Utilities

Work with towns with which Raleigh has merger agreements to ensure that development-related policies are followed.

Drinking Water

The capacity of the City's drinking water system is defined by two variables: (1) quantity of water available to be extracted from Falls Lake and other reservoirs, operationalized as a "safe yield" factor based on historical rainfall data; and (2) the rated capacities of the City's water treatment plants, which are usually sized by applying a peaking factor to the safe yield of the reservoir. The latter is under human control, while the former depends in part on factors beyond human control, including the size of the reservoir and its watersheds and the quantity of rainfall. ~~Recent droughts~~Droughts between 2010 and 2012 have stoked concerns regarding Raleigh's physical water resources. Measures to manage demand and increase system efficiency will be important adjuncts to expanding treatment capacity. Over the longer term, new water sources will be needed to meet the projected growth in water demand of about 43 million gallons per day (average) between 2006 and 2030. These sources will include drinking water reservoirs such as the Little River Reservoir, as well as alternative but impaired water supplies such as reuse water and grey water that can be allocated for uses tolerant of the lower quality. However, a major element in the overall water strategy will be slowing the growth in demand through increased efficiency and conservation.

In light of the ongoing national issues related to lead in drinking water, the City of Raleigh Public Utilities Department believes it is important to describe the efforts which have been undertaken to protect our customers and provide clean, safe drinking water. Since 1991, public water providers like the City of Raleigh are required by the Federal Safe Drinking Water Act to monitor Tier 1 sites for lead and copper levels in the drinking water on a reoccurring schedule. Tier 1 monitoring sites are single family residences served by copper plumbing with lead solder joints installed after 1982 or any sites with lead services lines regardless of installation date. The City of Raleigh has been, and continues to be compliant with Federal and State rules regulating lead and copper in drinking water. The most recent lead and copper distribution system sampling was performed in the summer of 2013, and the results for all samples were below the Federal Action Level for lead (0.015 parts per million) and copper (1.3 parts per million). The next round of sampling for lead and copper is scheduled for the summer of 2016.

Policy PU 3.1

Potable Water Delivery

Provide for the safe and efficient delivery of high quality potable water. (1, 3, 5, 6)

Policy PU 3.2

Planning for Drought

Enhance the City's water system planning to take changes in climate and precipitation patterns into account when projecting future water supply availability. (3, 5, 6)

Policy PU 3.3

Water Supply as a Planning Consideration

Factor water supply issues into planning for the City's growth, including assessing the impacts from the rezoning process, as well as incorporating demand management considerations into the City's development standards. (3, 5, 6)

Policy PU 3.4

Matching Water Supply with Water Use Requirements

Increase efficiency by putting all forms of water to its most appropriate use by better matching actual water use requirements with available potable and non-potable sources. (3, 5)

Policy PU 3.5

Alternative Water Sources

Increase the use of reclaimed water and other non-potable sources such as rainwater to relieve pressures on the potable water treatment system. (3, 5)

Policy PU 3.6

Reclaimed Water Priorities

Prioritize the implementation of reclaimed water infrastructure to serve the largest potential users and concentrations of users. (3)

Policy PU 3.7

Water Conservation

Increase the use of water conservation measures and minimization techniques. Examples include drought-resistant landscaping standards and financial incentive programs. (3, 5, 6)

Policy PU 3.8

Water System Performance Management

Apply current Best Management Practices (BMPs) to Raleigh's drinking water systems. Ensure that management strategies shift the focus from compliance to sustainability and improved performance. (1,3, 5)

Policy PU 3.9

Watershed-Based Planning

Adopt watershed-based approaches to water supply planning to promote decisions based on a holistic view of the entire water system (See Text Box: A Holistic Approach to Watersheds). (3, 5)

Policy PU 3.10

Water Quality Improvements

Improve potable water quality through the preservation and restoration of natural landscape features such as lakes, floodplains, wetlands, and their buffers. (3, 5) *See also Element C: 'Environmental Protection' for related policies.*

Policy PU 3.11

Protection of Water Supply

Protect the water supply from incompatible uses and activities that could compromise drinking water quality and safety. (1, 5)

Policy PU 3.12

Water Service Adequacy

Provide adequate water service to all currently unserved lots within the City. (1, 3, 6)

Policy PU 3.13

Conservation Education

Engage the public to promote an understanding of the need for water conservation and reuse. (3, 5, 6)

Policy PU 3.14

Calibration of Safe Yield

Consult with Army Corp of Engineers as necessary to maintain an accurate calibration of safe yield factor for Falls Lake, so that recent climate and stream flow data are reflected in the City's water supply planning models. (3, 5)

Action PU 3.1

Falls Lake Water Supply Study

Request that the Army Corps of Engineers perform what is known as a 219 study to look at any modifications to the current allocation configuration, including reallocating water in the conservation and flood pools to match changing climate conditions.

Action PU 3.2

Reserved

Action PU 3.3

Water Conservation

Continue the City's water conservation public education campaign to promote water awareness and an ethic of managing water usage.

Action PU 3.4

Reserved

Action PU 3.5

Reserved

A Holistic Approach to Watersheds

A holistic view of the water system recognizes that any decision made regarding withdrawal, discharge, or modification has impacts that ripple through the entire watershed. Urban uses are now an integral part of overall hydrology, making a complete return to a "state of nature" not only infeasible but also problematic. For example, if rainwater harvesting were to become pervasive, it would dramatically alter flow patterns in small streams, probably decreasing base flows in dry weather, and impacting what may be a fragile aquatic habitat accustomed to current flow patterns. An alternative would be to extend the re-use system, but that might require increased releases from Falls Lake to maintain downstream minimum flows. These examples illustrate how decisions increasingly involve complex interactions with a broad range of issues, requiring a more holistic approach than in the past.

Wastewater Collection and Dispersal

With the growth in the City's water demand will come a corresponding increase in wastewater generated. Additional investments will be needed to increase capacity at Raleigh's wastewater treatment plants as well as the sewer pipes and pump stations that convey wastewater to these plants. Wherever possible, gravity systems are preferred over pressure collection systems for reasons of reliability and lower operating and maintenance costs. Also, private wastewater treatment systems are discouraged because inadequately-maintained and -monitored systems can lead to poor quality in nearby streams and rivers. ~~Wastewater flows are expected to increase by about 41~~Every day an average of 45.1 million gallons per day ~~between 2006 and 2030 (based on projected~~(MGD) of wastewater for this reporting period travels through the City's sanitary sewer collection system~~ wide average annual flows).~~

. While wastewater has traditionally been viewed as a by-product to be disposed of, it will increasingly be viewed as a resource from which to wring extended value. Reclaimed water will be dispersed into a variety of receiving environments, moving beyond irrigation to include wetland and stream augmentation and even groundwater recharge. Mining re-use water from the wastewater stream can forestall the need to increase the capacity of sewer trunk lines by reducing total downstream flows. The City already has an award-winning program that uses bio-solids to complete the nutrient cycle on City-owned farmland. In the future, bio-solids may be utilized as a source of energy through combustion or as a source of methane.

The following policies are intended to address wastewater in the context of promoting long-term resource efficiency and sustainability.

Policy PU 4.1

Wastewater Treatment

Provide sufficient wastewater treatment in the most efficient manner to eliminate any potential for health hazards. (3, 6)

Policy PU 4.2

Wastewater Service Adequacy

Provide adequate wastewater service to all currently-unserved lots within the City. (1, 3, 6)

Policy PU 4.3

Sewer Line Replacement

Provide for the replacement of aging sanitary sewer collection systems to prevent overflow and backups. (3, 5)

Policy PU 4.4

Wastewater Collection System Expansion

Expand the wastewater collection system to serve potential annexation areas, urbanizing areas, and long-term growth areas with gravity sewer extensions and minimal use of pump stations. (3, 5)

Policy PU 4.5

Reclaimed water

Expand the re-use programs for wastewater treatment plant effluent and expand the use of reclaimed water for non-potable water uses. (3, 5)

Policy PU 4.6

Package Treatment Plants

Allow no privately-owned or -operated package wastewater treatment plants in City service and jurisdictional areas. (3, 5)

Policy PU 4.7

Pump Stations and Force Mains

Ensure that pump stations and force mains are environmentally sound and operationally efficient. They should be provided with on-site emergency electric generators and wireless communication equipment to monitor their status. They are preferably temporary facilities that can be replaced by gravity sewers. (3, 5)

Policy PU 4.8

Pressure Collection

Allow no new pressure collection sewer systems in City service and jurisdictional areas. (3, 5)

Policy PU 4.9

Sewer Overflows

Maintain the sewer collection system with the goal to eliminate sanitary sewer system overflows. (3, 5)

Policy PU 4.10

Fats, Oils, and Grease Disposal

Promote the proper disposal of Fats, Oils, and Grease (FOG) for households to help prevent sewer line clogging. (3, 5)

Policy PU 4.11

Bio-solids and Methane Gas Reuse

Provide for the beneficial re-use of 100 percent of bio-solids and methane gas production from all wastewater treatment plants, unless impractical. (3, 5)

Action PU 4.1

Reserved

Action PU 4.2

Pigeon House Branch Restoration

Implement a stream restoration project after assigning total maximum daily waste load for the Pigeon House Branch. Evaluate reclaimed water for its effectiveness to support restoration efforts that augment stream flows and improve water quality.

Action PU 4.3

Bio-solids Target

Set and achieve a target of treating 100 percent of bio-solids to the Class A level, a level where bio-solids are pasteurized to eliminate all pathogens making them safe for public uses such as composting.

Action PU 4.4

Methane Capture at Neuse River Plant

Investigate and develop a program for capture and use of methane at the Neuse River Wastewater Treatment Plant site.

Action PU 4.5

Reserved

Stormwater

Urban runoff is the primary pollutant source for the region's lakes, streams, and other surface waters. Poorly controlled runoff contributes to increased rates of stream bank erosion and lake sedimentation. Stormwater also contains numerous pollutants such as rubber, oil and antifreeze from automobiles, chemicals from lawns, and excess sediment associated with carelessly conducted land-disturbing activity. Runoff not only degrades the environment but also imposes costs on downstream neighborhoods and communities, as well as the public sector. Ongoing improvements to the City's stormwater infrastructure, programs, and regulations will be directed to improving the overall health of urban watersheds. Through sustainable practices that protect water quality, enhance fish and wildlife habitat, and provide for urban green spaces an improved quality of life will be realized.

~~Raleigh's Stormwater Division has completed 15 drainage basin studies to date, identifying over $140 million in needed improvements to alleviate existing stormwater problems and to preserve existing lakes.~~As part of stormwater management program, the City is developing stormwater management plans for each of the approximately 25 drainage basins located completely or partially within the City's Extraterritorial Jurisdiction (ETJ). The purpose of each stormwater management plan is to provide recommendations for structural and nonstructural improvements that may be made in the drainage basin to alleviate existing and projected future stormwater problems related to flooding, erosion, and water quality. As more such studies are completed, it can be anticipated that

more problems will be identified. Flood damage is currently the primary concern but water quality improvements will have to be implemented in order to meet federal and state regulations.

The following policies address the stormwater impacts of new development and redevelopment, stream quality improvements, and existing stormwater problems.

See also C.3 'Water Quality and Conservation' in Element C: 'Environmental Protection' for related policies.

Policy PU 5.1

Sustainable Stormwater Management

Reduce run-off velocity and improve water quality from existing and new development using sustainable infrastructure techniques that use soils and vegetation to capture, cleanse, and re-use stormwater runoff. (5, 6)

Policy PU 5.2

Drainage Basin Approach to Stormwater Planning

Use drainage basin-focused studies to determine the locations of future and additional stormwater facilities. (5)

Policy PU 5.3

Stormwater Financing

Provide an equitable system of stormwater financing based on relative contributions to the stormwater problem. (1, 3, 5, 6)

Policy PU 5.4

Discharge Control Methods

Apply discharge control methods that control both peak and volume and that are economically, aesthetically, and environmentally acceptable as well as effective in stormwater management. (5)

Policy PU 5.5

Stormwater Education

Educate and involve the public in stormwater management. (5)

Policy PU 5.6

Rainwater Collection and Storage

Where adjacent waters are not vulnerable to even minor reductions in base flow, encourage the deployment and use of rainwater collection and storage systems such as rain barrels and cisterns and rain gardens by residential and commercial property owners and managers. (5, 6)

Action PU 5.1

Reserved

Action PU 5.2

Stormwater Fee Review

Revisit the stormwater fee structure as necessary to provide adequate program funding.

Action PU 5.3

Drainage Basin Studies

Continue to complete additional drainage basin studies until Raleigh's entire jurisdiction and Urban Service Areas have been covered by such studies.

Action PU 5.4

Green Infrastructure Study

Undertake a green infrastructure study that identifies landscapes where stormwater can be absorbed naturally. Model both watersheds and sub-watersheds for the amount of green infrastructure that is present to perform this function.

Action PU 5.5

Stormwater Basin Solids Removal

Pursue collaborative opportunities with the academic and regulatory communities to begin characterization of solids to be removed from stormwater basins, and develop a plan for their utilization or safe ultimate disposal as governing regulations evolve.

Energy and Telecommunications

While the City's energy and telecommunications infrastructure is privately owned, there is still significant public sector involvement with these services. Transmission lines occupy public rights-of-way, and the City regulates telecommunications towers to promote public safety and manage impacts.

As the City looks at ways to cut its greenhouse gas emissions, power generation and consumption must be an important part of any strategy. Coal is currently the cheapest and most widely used source of baseline power generation. It is also the most carbon-intensive. Utilities are increasingly supplementing their power generation infrastructure with decentralized natural-gas power peaking plants and, increasingly, distributed micro-power sources with a focus on renewables. Growth in distributed micro-power requires smarter electricity grids, net metering, and other modernizations. Distributed power generation also presents the opportunity for cogeneration—the capture of otherwise lost heat to warm buildings and perform other functions. As generating technology rapidly evolves, the City's land use and building codes must keep pace to make sure such innovations can be accommodated in new development and redevelopment.

Policy PU 6.1

Energy and Telecommunications Planning

Work with regional and private organizations to plan for adequate future energy and telecommunications facilities and service delivery. (3)

Policy PU 6.2

Alternative Energy Sources

Foster alternative energy sources within the region and state to mitigate rising energy costs and associated environmental impacts. (3, 5)

Policy PU 6.3

Visual Impacts of Utility Infrastructure

Consider ways to affect the placement and appearance of utility infrastructure—including substations, transmission towers and lines, and switching boxes—to minimize visual disruption and negative effects on quality of life, and to enhance streetscapes in pedestrian- oriented districts. (6)

Policy PU 6.4

Undergrounding in Downtown and along Major Corridors

Work with utility providers to place utilities underground in the downtown and along major road corridors, with a particular priority on those streets identified as retail streets in the Downtown Element. (6)

Policy PU 6.5

Undergrounding in Pedestrian Business Districts

Work with utility providers to place utilities underground as part of streetscape projects undertaken in pedestrian-oriented business districts. (6)

Policy PU 6.6

Cogeneration

Partner with local electricity providers to explore the potential for cogeneration (power+heat) in future projects. (3, 5)

Policy PU 6.7

Removing Barriers in Renewable Energy

Remove prohibitions and reduce barriers that impede the installation of solar panels, the use of clotheslines, and other renewable technologies in neighborhoods governed by overlay districts, restrictive covenants, and homeowner associations while allowing for appropriate oversight in historic overlay districts. (5, 6)

Action PU 6.1

Distributed Generation Pilot Project

Incorporate a distributed generation project as part of a significant City capital project, such as installation of photovoltaics over a parking facility, provision of a wind-turbine as part of a tall building, or other similar concept.

Action PU 6.2

Cogeneration Pilot Project

Identify an opportunity for using cogeneration either downtown or as part of a significant public facility.

Action PU 6.3

Coordination with Utilities

Convene regular meetings with utility companies to compare growth projections and to discuss other long-range planning issues.